Human Brain Project

EBRAINS

BRAIN SIMULATION SCHOOL 2022

TRAINING ON SINGLE NEURON MODELS, BRAIN CIRCUIT MODELS, COGNITION, COLLABORATORY, SYNAPTIC PLASTICITY AND LEARNING

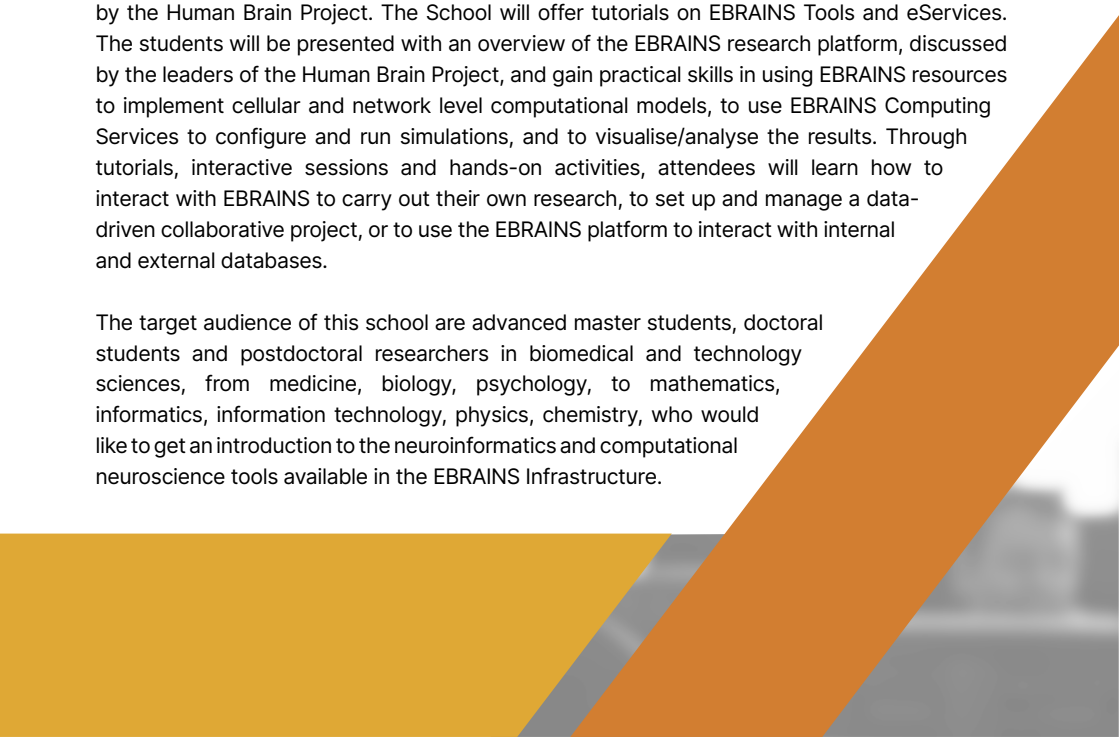
30 May – 3 June 2022
Palermo, Italy

SCIENTIFIC PROGRAMME

ABOUT THE EVENT

The EBRAINS Brain Simulation School 2022 aims at introducing the participants to the latest achievements and innovations of the digital infrastructure for brain research EBRAINS, created by the Human Brain Project. The School will offer tutorials on EBRAINS Tools and eServices. The students will be presented with an overview of the EBRAINS research platform, discussed by the leaders of the Human Brain Project, and gain practical skills in using EBRAINS resources to implement cellular and network level computational models, to use EBRAINS Computing Services to configure and run simulations, and to visualise/analyse the results. Through tutorials, interactive sessions and hands-on activities, attendees will learn how to interact with EBRAINS to carry out their own research, to set up and manage a data-driven collaborative project, or to use the EBRAINS platform to interact with internal and external databases.

The target audience of this school are advanced master students, doctoral students and postdoctoral researchers in biomedical and technology sciences, from medicine, biology, psychology, to mathematics, informatics, information technology, physics, chemistry, who would like to get an introduction to the neuroinformatics and computational neuroscience tools available in the EBRAINS Infrastructure.



Scientific Committee:

Michele Migliore | Italian National Research Council
Aušra Saudargienė | Lithuanian University of Health Sciences
Francesca Spataro | Italian National Research Council
Alessia Bonafede | Italian National Research Council

National Research Council of Italy

LITHUANIAN UNIVERSITY OF HEALTH SCIENCES

Contact:
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Further information:
https://www.humanbrainproject.eu/en/education/BRAINSIM

Organised by:

Human Brain Project Education Programme

Monday 30 May 2022

Please note that all times are in CEST (=GMT/UTC+2)

09:00 – 9:30	Welcome & Introduction to the School Michele Migliore | Institute of Biophysics, Italian National Research Council
	Session I - EBRAINS Infrastructure for Brain Research Chair: Michele Migliore | Institute of Biophysics, Italian National Research Council
09:30 – 10:30	The EBRAINS European Infrastructure in the European context Paweł Świeboda | EBRAINS AISBL CEO and Director General of the Human Brain Project
10:30 – 11:00	Coffee break
11:00 – 11:45	The EBRAINS Research Platform Jan Bjaalie | HBP Research Infrastructure Director, Institute of Basic Medical Sciences, University of Oslo
11:45 – 12:30	The role of EBRAINS in engaging society and communities in neuroscience France Nivelle | EBRAINS AISBL
12:30 – 14:30	Lunch break
14:30 – 15:15	EBRAINS technology for developers Marc Morgan | EBRAINS AISBL
15:15 – 16:00	Workshop: The EBRAINS Collaboratory for users Annapaola Santarsiero | EBRAINS AISBL
	Tutorial I: Hands-on EBRAINS for electrophysiological feature extraction
16:00 – 17:30	Basic tools for electrophysiological features extraction (theory and practice)* Luca L. Bologna & Rosanna Migliore | Institute of Biophysics, Italian National Research Council
	* Coffee available from 16:00 – 16:30
17:30 – 18:00	Interactive session

Tuesday 31 May 2022

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Session II: Student presentations
Chair: Paola Vitale | Institute of Biophysics, Italian National Research Council

09:00 – 10:30 Student presentations I

10:30 – 11:00 Coffee break

11:00 – 12:30 Student presentations II

12:30 – 14:30 Lunch break

Session III: Synaptic Plasticity and Learning
Chair: Rosanna Migliore | Institute of Biophysics, Italian National Research Council

14:30 – 15:15 Empiric models of synaptic plasticity
Michele Migliore | Institute of Biophysics, Italian National Research Council

15:15 – 16:00 Detailed models of synaptic plasticity
Aušra Saudargienė | Lithuanian University of Health Sciences

Tutorial II: Hands-on EBRAINS for modelling local field potentials

16:00 – 17:30 Modelling local field potentials (theory and practice)*
Gaute Einevoll | Norwegian University of Life Sciences

* Coffee available from 16:00 – 16:30

17:30 – 18:00 Interactive session

20:00 Social Dinner

Wednesday 1 June 2022

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	Session IV: Single Neuron Models **Chair: Aušra Saudargienė | Lithuanian University of Health Sciences**
09:00 – 10:30	Scientific drive: single cell modelling **Michele Migliore | Institute of Biophysics, Italian National Research Council**
10:30 – 11:00	Coffee break
11:00 – 12:30	Single cell model optimisation: algorithms, methods, resources **Luca L. Bologna, Rosanna Migliore & Paola Vitale | Institute of Biophysics, Italian National Research Council**
12:30 – 14:30	Lunch break
	Tutorial III: Hands-on EBRAINS for single neuron modelling
14:30 – 17:30	Build your own cell model* **Luca L. Bologna & Rosanna Migliore | Institute of Biophysics, Italian National Research Council** * Coffee available from 16:00 – 16:30
17:30 – 18:00	Interactive Session

Thursday 2 June 2022

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Session V: Brain Circuit Models
Chair: Michele Migliore | Institute of Biophysics, Italian National Research Council

Success story: Detailed model of hippocampus CA1, Part I (science)
Chair: Michele Migliore | Institute of Biophysics, Italian National Research Council

09:00 – 09:30 General introduction to data-driven brain tissue modelling
Felix Schürmann | Blue Brain Project, EPFL

09:30 – 10:00 Virtual Talk: Reconstruction and simulation of a full-scale model of rat hippocampus CA1
Armando Romani | Blue Brain Project, EPFL

Assistant: Davide Bella | EPFL

10:00 – 10:30 Hippocampus Hub and MOOC
Jean-Denis Courcol | Blue Brain Project, EPFL

10:30 – 11:00 Coffee break

Success story: Detailed model of hippocampus CA1, Part II (hands-on)
Chair: Jean-Denis Courcol | Blue Brain Project, EPFL

11:00 – 12:30 Hands-on Exercises on analysing the circuit and simulations and Hippocampus Hub
Armando Romani, Gianluca Ficarelli & Joni Herttuainen | Blue Brain Project, EPFL

12:30 – 14:30 Lunch break

Success story: Detailed model of cerebellum
Chair: Daniela Gandolfi | UNIMORE

14:30 – 15:15 Multiscale brain modeling
Egidio D'Angelo | University of Pavia

15:15 – 16:00 Modeling pipeline for the Cerebellum
Claudia Casellato | University of Pavia

16:00 – 16:15 Coffee break (Coffee available from 16:00 – 16:30)

Tutorial IV: Hands-on, circuit modelling

16:15 – 17:15 Scientific drive: modelling the mouse, and human Hippocampus with spiking neurons
Daniela Gandolfi | UNIMORE

17:15 – 18:00 The Brain Scaffold Builder
Claudia Casellato & Robin De Schepper | University of Pavia

Friday 3 June 2022

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	Session VI: Cognition **Chair: Egidio D'Angelo | University of Pavia**
09:00 – 10:30	Scientific drive: Modelling cognitive functions **Michele Migliore | Institute of Biophysics, Italian National Research Council**
10:30 – 11:00	Coffee break
11:00 – 12:00	Using NEURON+python, from laptops to supercomputer systems **Michael Hines | Yale University**
12:00 – 12:30	Tech drive: NetPyNE, a tool for multiscale modeling of brain circuits **Salvador Dura-Bernal | SUNY**
12:30 – 14:30	Lunch break
	Tutorial V: Hands-on EBRAINS for building networks
14:30 – 15:00	Tech drive: interacting with HPC systems **Luca L. Bologna | Institute of Biophysics, Italian National Research Council**
15:00 – 16:00	Hands-on session: using NetPyNE on EBRAINS to build networks **Salvador Dura-Bernal | SUNY** **Adam Ponzi | Institute of Biophysics, Italian National Research Council**
16:00 – 17:30	Interactive session and conclusions*
	* Coffee available from 16:00 – 16:30

Student presentations

Student presentations I:

A model of early altered excitability in ventral CA1 pyramidal neurons of Tg2576 AD mice
Elisabetta Giacalone
Italian National Research Council

Perceptual decision-making and neuromodulation
Fabian Kamp
Max Planck Institute

Visual Streak Localization in Spectral Domain Optical Coherence Tomography Images of Minipigs
Tengyingzi Ma
University of Zurich

Modeling the formation of a hippocampal place cell
Camille Mazzara
Italian National Research Council

CKAMP44 modulates processing of visual information by dLGN relay neurons
Sonia Ruggieri
Johannes Gutenberg University Mainz

Student presentations II:

Advanced neuroscience software tools and solutions
Matteo Cantarelli
MetaCell LLC

Convolutive models of brain networks
Giuseppe Giacopelli
University of Palermo

A simple Caenorhabditis elegans circuit: Biophysical Modeling of AWC-AIY synapses
Nicole Luchetti
University of Rome

Cortical Spike Synchrony as a Measure of Contour Uniformity
Julius Mayer & Viktoria Zemliak
Osnabrück University

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